AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1-23 (Cancelled)

24. (Currently amended) An apparatus for separating molecules, said apparatus comprising:

a semiconductor material layer;

a counter electrode <u>that is a transparent insulating material having at least one surface coated by a film of a conductive material</u>;

an electrically conductive layer located between and in contact with the semiconductor and in contact with the counter electrode, the electrically conductive layer further including at least two different molecules that are separable by the apparatus;

a voltage source electrically coupled to the semiconductor and the counter electrode wherein the voltage source applies a voltage potential across the electrically conductive layer to thereby generate a depletion region in the semiconductor; and

at least one photon energy source incident upon the semiconductor having the depletion region wherein the photon energy source generates photon energy sufficient to form electron hole pairs that are separated by the voltage potential depletion region thereby generating a photopotential at the surface of the semiconductor material causing charged molecules in the electrically conductive layer in contact with the semiconductor material to move in response to the localized photovoltage, wherein at least one of the photon energy source and the semiconductor is movable relative to the other.

25. (Previously presented) The apparatus of claim 24 in which the semiconductor includes a material selected from the group consisting of Si, Ge, GaAs, TiO_2, CdS, and ZnO.

26. (Previously presented) The apparatus of claim 24, wherein the electrically conductive layer is a film.

27. (Previously presented) The apparatus of claim 26, wherein the film comprises an admixture of a composition selected from the group consisting of polyacrylamide, dextran, polymethyl methacrylate and agarose and the at least two different molecules that are being separated by the apparatus.

28. (Previously presented) The apparatus of claim 24, wherein the photon energy source produces a focused beam of light to create a localized photopotential at the surface of the semiconductor and located at an interface between the semiconductor and the electrically conductive layer.

29. (Previously presented) The apparatus of claim 24, wherein the photon energy source is a laser.

30. (Previously presented) The apparatus of claim 24, wherein the photon energy source is a scannable laser.

31. (Previously presented) The apparatus of claim 24, wherein the photon energy source is modulated.

32. (Previously presented) The apparatus of claim 24 wherein the photon energy source is pulsed.

33. (Previously presented) The apparatus of claim 24 wherein the photon energy source is chopped.

34. (Previously presented) The apparatus of claim 24, wherein the photon energy source is movable relative to an interface between the semiconductor and the electrically conductive layer to scan photon energy across said interface.

35. (Previously presented) The apparatus of claim 24, in which the voltage source is applied between the counter electrode and the semiconductor material using a potentiostat electrically connected to these the counter electrode and to the semiconductor material.

36. (Previously presented) The apparatus of claim 24, wherein the voltage source applies a modulated voltage potential.

37. (Previously presented) The apparatus of claim 24, wherein said surface is artificially patterned to provide resistance to the molecular motion for separation.

38. (Previously presented) The apparatus of claim 24, wherein the voltage source applies an alternating voltage potential.

39. (Previously presented) The apparatus of claim 24, wherein the counter electrode is optically tansmissive.

40. (Cancelled)

41. (Previously presented) The apparatus of claim 24, wherein the counter electrode is indium doped tin oxide.

42. (Cancelled)

43. (Previously presented) An apparatus for separating molecules, said apparatus comprising:

a semiconductor material layer;

a counter electrode;

an electrically conductive layer located between and in contact with the semiconductor and the counter electrode, the electrically conductive layer further including at least two different molecules that are being separated by the apparatus;

an interface located between the semiconductor material layer and the electrically conductive layer;

a voltage source electrically coupled to the semiconductor and the counter electrode wherein the voltage source applies a voltage potential across the interface to thereby generate a depletion region in the semiconductor; and

at least one photon energy source incident upon the semiconductor having the depletion region wherein the photon energy source generates photon energy sufficient to form electron hole pairs that are separated by the voltage potential depletion region thereby generating a photopotential at the surface of the semiconductor material causing charged molecules in the electrolyte medium in contact with the semiconductor material to move in response to the localized photovoltage, wherein at least one of the photon energy source and the semiconductor is movable relative to the other wherein the counter electrode is a transparent insulating material having at least one surface coated by a film of a conductive material wherein the transparent insulating material is selected from the group of materials consisting of glass and quartz, and the conductive material is selected from the group of materials consisting of gold and platinum.

44. (Previously presented) A method for separating molecules, said method comprising:

applying a voltage between a semiconductor material and a counter electrode to generate voltage potential that creates a depletion region in the semiconductor material, wherein the semiconductor material and the counter electrode are separated by a gap that contains an electrically conductive layer that is in contact with the semiconductor material and with the counter electrode, wherein the electrically conductive layer contains an admixture of a plurality of different charged analyte molecules of interest;

irradiating a location on the semiconductor material layer that corresponds to the depletion region with a photon energy source, wherein the photon energy source has sufficient

energy to form electron hole pairs in the depletion region wherein the electron hole pairs are separated by the voltage potential to form a localized photopotential; and

moving the location on the semiconductor material layer that is irradiated by the photon energy source to create a corresponding change in photopotential at the interface of the semiconductor material and the electrically conductive layer thereby inducing the migration of the charged analyte molecules wherein at least two of the plurality of different charged analyte molecules migrate at different rates to effectuate molecular separation.

45. (Previously presented) The method of claim 44 in which the semiconductor material is selected from the group consisting of Si, Ge, GaAs, TiO_2, CdS, and ZnO.

46. (Previously presented) The method of claim 44, wherein the electrically conductive layer is a film.

47. (Previously presented) A method for separating molecules, said method comprising:

applying a voltage between a semiconductor material and a counter electrode to generate voltage potential that creates a depletion region in the semiconductor material, wherein the semiconductor material and the counter electrode are separated by a gap that contains an electrically conductive layer that is in contact with the semiconductor material and with the counter electrode, wherein the electrically conductive layer contains an admixture of a plurality of different charged analyte molecules of interest;

irradiating a location on the semiconductor material layer that corresponds to the depletion region with a photon energy source, wherein the photon energy source has sufficient energy to form electron hole pairs in the depletion region wherein the electron hole pairs are separated by the voltage potential to form a localized photopotential; and

moving the location on the semiconductor material layer that is irradiated by the photon energy source to create a corresponding change in photopotential at the interface of the semiconductor material and the electrically conductive layer thereby inducing the migration of the charged analyte molecules wherein the electrically conductive layer is a film and wherein the film comprises an admixture of a composition selected from the group consisting of

polyacrylamide, dextran, polymethyl methacrylate and agarose and the at least two different molecules that are being separated by the apparatus.

48. (Previously presented) The method of claim 44 wherein at least two of the plurality of different analyte molecules are separated from the admixture of a plurality of different analyte molecules.

49. (Previously presented) The method of claim 44 wherein the electrically conductive layer is a film that resists movement of analyte molecules to facilitate separation of different analyte molecules.

50. (Previously presented) The method of claim 44 wherein the applied voltage potential is alternated to cause the motion of the charged analyte molecules to alternate between the semiconductor material and the counter electrode.

51. (Previously presented) The method of claim 44, including focusing the photon energy to produce a beam of light to create a localized photopotential at the surface of the semiconductor material photosensitive and located at the interface between the semiconductor material and the electrically conductive layer.

52. (Previously presented) The method of claim 44, wherein the photon energy source is a laser.

53. (Previously presented) The method of claim 44, wherein the photon energy source is applied intermittently.

54. (Previously presented) The method of claim 53 wherein a reversing potential is applied between the semiconductor material and the counter electrode when the photon energy source is in a light off cycle.

55. (Previously presented) The method of claim 44 including moving the photon energy source relative to an interface between the semiconductor and the electrically conductive layer to scan photon energy across said interface

56. (Previously presented) The method of claim 44 wherein the photon energy source is an array of light beams.

57-58. (Cancelled)